This listing of claims will replace all prior versions and listings of claims in this application:

Listing of Claims

1. (Currently amended) An image sensor element comprising:

a semiconductor substrate,

a radiation transparent insulating layer formed on the semiconductor substrate,

an electrode formed as a layer of transparent resistive material on the insulating layer, the transparent resistive material extending across a photosensitive part of the image sensor element in which incident light is converted into photogenerated charges,

a first contact adjacent to a first edge of the resistive layer,

a first diffusion region in the semiconductor substrate of opposite conductivity to the semiconductor substrate located adjacent to the first contact and biased to a higher potential than that of the first contact,

a second contact adjacent to a second edge, opposite the first edge, of the resistive layer,

a second diffusion region ~~is~~ in the semiconductor substrate of opposite conductivity to the semiconductor substrate located adjacent to the second contact and biased to a higher potential than that of the second contact,

means for applying an electrical potential between the first and second contacts, and

means for reading out the charge on the first and/or second diffusion regions;

wherein the resistive layer is rectangular; and

in which the contacts are arranged one at each side.

2. (Currently amended) The image sensor element as claim in claim [[1]] 19, wherein the resistive layer is rectangular.

3. (Currently amended) The image sensor element as claimed in claim [[2]] 1, comprising four contacts each having a diffusion region adjacent thereto.

4. (Currently amended) The image sensor element as claim in claim [[2]] 19, in which the contacts are arranged one at each side.

5. (Previously presented) The image sensor element as claimed in claim 3, in which the contacts are arranged one at each corner.

6. (Previously presented) The image sensor element as claimed in claim 3, in which two contacts are arranged on each of two opposite sides.

7. (Previously presented) The image sensor element as claimed in claim 1, in which the resistive layer is square.

8. (Previously presented) The image sensor element as claimed in claim 1, in which the insulating layer is between 1 nanometer (nm) and 1 micrometer (μm) thick.

9. (Previously presented) The image sensor element as claimed in claim 1, in which the electrode has a sheet resistivity of greater than 10 Ohms (Ω)/square.

10. (Previously presented) The image sensor element as claimed in claim 1, in which the photosensitive part of the element is implemented in a semiconducting layer at the surface of the substrate, the surface semiconducting layer being of opposite conductivity to the substrate, the element further comprising means for biasing the surface semiconducting layer so that it is fully depleted.

11. (Withdrawn) The image sensor element as claimed in claim 1, in which the read out means is implemented as a source follower with a pixel select transistor.

12. (Withdrawn) The image sensor element as claimed in claim 1, in which the readout means is implemented as a resettable charge amplifier with a pixel select transistor.

13. (Previously presented) The image sensor element as claimed in claim 1, in which the readout means is implemented as a transconductance amplifier, for

measuring the photocurrent at the first or second diffusion regions, with a pixel select transistor.

14. (Withdrawn) The image sensor element as claimed in claim 10, in which the readout means is implemented in the surface semiconductor layer, the surface semiconductor layer is arranged to be connected to ground potential, and the semiconductor substrate is arranged to be connected to a potential such as to produce a deep depletion layer in the semiconductor substrate.

15. (Currently amended) A device for the detection and demodulation of a modulated wavefield, comprising:

an image sensor including a one or two dimensional array of image sensor elements formed on a semiconductor substrate, each image sensor element comprising:

a radiation transparent insulating layer formed on the semiconductor substrate,

an electrode formed as a layer of transparent resistive material on the insulating layer, the transparent resistive material extending across a photosensitive part of the image sensor element in which incident light is converted into photogenerated charges,

a first contact adjacent to one a first edge of the resistive layer,

a first diffusion region in the semiconductor substrate of opposite conductivity to the semiconductor substrate located adjacent to the first contact and biased to a higher potential than that of the first contact,

a second contact adjacent to a second edge, opposite the first edge, of the resistive layer, and

a second diffusion region is in the semiconductor substrate of opposite conductivity to the semiconductor substrate located adjacent to the second contact and biased to a higher potential than that of the second contact;

a signal generator for supplying time dependent voltage patterns to the contacts on each of the image sensor element electrodes in synchronism with the modulation frequency of the incident wavefield to transport photocharges

laterally from the photosensitive part of each of the image sensor elements to the corresponding diffusions on which photocharges are accumulated; and

a readout circuit for reading out the charges on the diffusions for use in calculating the modulation parameters of the incident modulated wavefield;

wherein the resistive layer is rectangular; and

in which the contacts are arranged one at each side.

16. (Previously presented) The device as claimed in claim 15, in which photocharges are accumulated over a plurality of periods of the modulation frequency of the incident wavefield.

17. (Previously presented) The device as claimed in claim 15, in which each period of the modulation frequency is divided into a number of time intervals; wherein a separate contact and diffusion region is provided in each image sensor element for each time interval.

18. (Previously presented) The device as claimed in claim 15, comprising an evaluation unit for calculating the modulation parameters of the incident wavefield from the charges readout from the diffusions.

19. (Previously presented) A method of detecting and demodulating modulated wavefields comprising the steps of:

a) illuminating an array of image sensing elements with the modulated wavefield, wherein each of the image sensing elements comprises:

a radiation transparent insulating layer,

an electrode formed as a layer of transparent resistive material on the insulating layer, the transparent resistive material extending across a photosensitive part of the image sensor element in which incident light is converted into photogenerated charges,

a first contact adjacent to one a first edge of the resistive layer,

a first diffusion region located adjacent to the first contact,

a second contact adjacent to a second edge, opposite the first edge, of the resistive layer, and

a second diffusion region located adjacent to the second contact;

b) dividing each period of the modulation frequency into a number of intervals;

c) providing a separate contact and corresponding diffusion region for each time interval;

d) transporting photoregenerated charge from the photosensitive part to the corresponding diffusion regions during each time interval and storing them therein;

e) reading out the stored charges from the diffusion regions; and

f) calculating demodulation parameters from the charges readout from the diffusion regions.

20. (Previously presented) The method as claimed in claim 19, in which charges are accumulated in the diffusion regions over more than one period of the modulation frequency.

21. (Previously presented) The method as claimed in claim 19, in which the wavefield is directed onto the array by optical elements.

22. (Previously presented) A method of determining the three dimensional shape of a reflective object comprising the steps of:

a) illuminating the object with a modulated light source;

b) imaging light reflected from the object onto an array of image sensor elements to form a two dimensional intensity modulated wavefield whose local phase represents local distance from the object to the detection device, wherein each of the image sensing elements comprises:

a radiation transparent insulating layer,

an electrode formed as a layer of transparent resistive material on the insulating layer, the transparent resistive material extending across a

photosensitive part of the image sensor element in which incident light is converted into photogenerated charges,

a first contact adjacent to one a first edge of the resistive layer,

a first diffusion region located adjacent to the first contact,

a second contact adjacent to a second edge, opposite the first edge, of the resistive layer, and

a second diffusion region located adjacent to the second contact;

c) dividing each period of the modulation frequency into a number of time intervals;

d) providing a separate contact and corresponding diffusion region for each time interval;

e) transporting photoregenerated charges to the corresponding diffusion regions by applying a potential across the first contact and the second contact during each time interval and storing them therein;

f) reading out the stored photogenerated charges from the diffusion regions;

g) calculating the local phase of the modulated wavefield incident on the array; and

h) using the local phase information to determine the three dimensional shape of the object.

23. (Previously presented) The image sensor element as claimed in claim 15, in which the insulating layer is between 1 nanometer (nm) and 1 micrometer (μm) thick.

24. (Previously presented) The image sensor element as claimed in claim 15, in which the electrode has a sheet resistivity of greater than 10 Ohms (Ω)/square.

25. (Previously presented) The image sensor element as claimed in claim 19, in which the insulating layer is between 1 nanometer (nm) and 1 micrometer (μm) thick.

26. (Previously presented) The image sensor element as claimed in claim 19, in which the electrode has a sheet resistivity of greater than 10 Ohms (Ω)/square.

27. (Previously presented) The image sensor element as claimed in claim 22, in which the insulating layer is between 1 nanometer (nm) and 1 micrometer (μm) thick.

28. (Previously presented) The image sensor element as claimed in claim 22, in which the electrode has a sheet resistivity of greater than 10 Ohms (Ω)/square.

29. (Currently amended) An image sensor element comprising:

a semiconductor substrate,

a radiation transparent insulating layer formed on the semiconductor substrate,

an electrode formed as a layer of transparent resistive material on the insulating layer, the transparent resistive material extending across a photosensitive part of the image sensor element in which incident light is converted into photogenerated charges,

a first contact adjacent to a first edge of the resistive layer,

a first diffusion region in the semiconductor substrate of opposite conductivity to the semiconductor substrate located adjacent to the first contact,

a second contact adjacent to a second edge, opposite the first edge, of the resistive layer,

a second diffusion region in the semiconductor substrate of opposite conductivity to the semiconductor substrate located adjacent to the second contact,

a voltage generator for applying an electrical potential between the first and second contacts, and

a read-out circuit for reading out the photogenerated charges on the first and/or second diffusion regions;

wherein the resistive layer is rectangular; and

in which the contacts are arranged one at each side.

30. (Cancelled)

31. (Currently amended) The image sensor element as claimed in claim [[30]] 29, comprising four contacts each having a diffusion region adjacent thereto.

32. (Cancelled)

33. (Previously presented) The image sensor element as claimed in claim 31, in which the contacts are arranged one at each corner.

34. (Currently amended) The image sensor element as claimed in claim [[32]] 29, in which two contacts are arranged on each of two opposite sides.

35. (Previously presented) The image sensor element as claimed in claim 29, in which the resistive layer is square.

36. (Previously presented) The image sensor element as claimed in claim 29, in which the insulating layer is between 1 nanometer(nm) and 1 micrometer (μm) thick.

37. (Previously presented) The image sensor element as claimed in claim 29, in which the electrode has a sheet resistivity of greater than 10 Ohms (Ω)/square.

38. (Previously presented) The image sensor element as claimed in claim 29, in which the photosensitive part of the element is implemented in a semiconducting layer at the surface of the substrate, the surface semiconducting layer being of opposite conductivity to the substrate, the element further being biased to deplete the surface semiconducting layer.